

Claims

What is claimed is:

1. A method of automated graphics generation in response to a user request comprising:

5 determining a measure of similarity between the user request and one or more stored graphics examples;

 obtaining at least one stored graphics example based on the similarity measure; and

10 creating graphics from the at least one obtained graphics example and the user request.

2. The method of claim 1, further comprising:

 determining whether the at least one obtained graphics example can be used for synthesizing graphics in accordance with the user request;

15 creating graphics when the at least one obtained graphics example can be used for synthesizing graphics in accordance with the user request;

 decomposing the user request into a set of sub-requests when at least one obtained graphics example cannot be used for synthesizing graphics in accordance with the user request; and

20 repeating the graphics generation method using the set of sub-requests.

3. The method of claim 2, wherein determining whether the at least one obtained graphics example can be used for synthesizing graphics comprises:

 determining whether each graphics example produces a match for data nodes in the user request;

25 determining whether important data is better represented in the graphics than less important data; and

determining whether every data leaf node in the user request has acquired a visual candidate so that graphics can be synthesized.

4. The method of claim 1, further comprising decomposing at least one graphics example.

5 5. The method of claim 4, wherein decomposing at least one graphics example comprises extracting independent visual structures.

6. The method of claim 4, wherein decomposing at least one graphics example comprises removing decorations.

10 7. The method of claim 4, wherein decomposing at least one graphics example comprises extracting leaf nodes to form a visual dictionary.

8. The method of claim 4, wherein decomposing at least one graphics example comprises dividing by data relations.

15 9. The method of claim 1, wherein the at least one obtained graphics example comprises a top-matched graphics example having the greatest similarity measurement to the user request.

10. The method of claim 1, further comprising providing user feedback while computing similarity measurements.

20 11. The method of claim 1, further comprising providing user feedback while creating graphics.

12. The method of claim 1, wherein obtaining at least one stored graphics example comprises:

arranging stored graphics examples into hierarchical clusters according to each computed similarity measurement;

5 searching a cluster at a highest hierarchical level most likely to contain a top-matched graphics example having the greatest similarity measurement to the user request;

determining a measure of similarity between the user request and each graphics example within the searched cluster; and

10 outputting at least one graphics example of the searched cluster having the greatest similarity measurement.

13. The method of claim 12, further comprising:

determining whether the searched cluster has no clusters inside it; and

15 repeating the method of obtaining at least one stored graphics example with clusters at a highest hierarchical level inside the searched cluster, if there are clusters inside the searched cluster, until a cluster having no clusters inside it is found.

14. The method of claim 12, wherein searching a cluster comprises:

selecting a representative graphics example from each cluster at the highest hierarchical level using an approximation; and

20 selecting the cluster having the representative graphics example with the greatest similarity measurement to the user request.

15. The method of claim 14, wherein the approximation uses meta properties of the stored graphics examples.

16. The method of claim 1, wherein creating graphics from at least one obtained graphics example comprises:

- 5 extracting at least one composition pattern from the database;
- generalizing the at least one composition pattern;
- determining whether at least one new composition is valid using at least one generalized composition pattern; and
- selecting the most probable valid composition.

17. The method of claim 16, further comprising:

- 10 generalizing at least one negative composition pattern; and
- determining whether at least one new composition is invalid using at least one generalized negative composition pattern.

18. The method of claim 1, wherein creating a new sketch comprises inferring visual decorations.

15 19. Apparatus for automatically generating graphics from a user request, the apparatus comprising:

- a memory; and
- at least one processor coupled to the memory and operative to: (i) determine a measure of similarity between the user request and one or more stored graphics examples;
- 20 (ii) obtain at least one stored graphics example based on the similarity measure; and (iii) create graphics from the at least one obtained graphics example and the user request.

20. The apparatus of claim 19, wherein the processor is further operative to:

determine whether the at least one obtained graphics example can be used for synthesizing graphics in accordance with the user request;

create graphics when the at least one obtained graphics example can be used for synthesizing graphics in accordance with the user request;

5 decompose the user request into a set of sub-requests when at least one obtained graphics example cannot be used for synthesizing graphics in accordance with the user request; and

repeat the graphics generation method using the set of sub-requests.

10 21. The apparatus of claim 20, wherein the operation of determining whether the at least one obtained graphics example can be used for synthesizing graphics comprises the operations of:

determining whether each graphics example produces a match for data nodes in the user request;

15 determining whether important data is better represented in the graphics than less important data; and

determining whether every data leaf node in the user request has acquired a visual candidate so that graphics can be synthesized.

22. The apparatus of claim 19, wherein the processor is further operative to decompose at least one graphics example.

20 23. The apparatus of claim 22, wherein the operation of decomposing at least one graphics example comprises the operation of extracting independent visual structures.

24. The apparatus of claim 22, wherein the operation of decomposing at least one graphics example comprises the operation of removing decorations.

25. The apparatus of claim 22, wherein the operation of decomposing at least one graphics example comprises the operation of extracting leaf nodes to form a visual dictionary.

5 26. The apparatus of claim 22, wherein the operation of decomposing at least one graphics example comprises the operation of dividing by data relations.

27. The apparatus of claim 19, wherein the at least one obtained graphics example comprises a top-matched graphics example having the greatest similarity measurement to the user request.

10 28. The apparatus of claim 19, wherein the processor is further operative to provide user feedback while computing similarity measurements.

29. The apparatus of claim 19, wherein the processor is further operative to provide user feedback while creating graphics.

15 30. The apparatus of claim 19, wherein the operation of obtaining at least one stored graphics example comprises the operations of:

arranging stored graphics examples into hierarchical clusters according to each computed similarity measurement;

20 searching a cluster at a highest hierarchical level most likely to contain a top-matched graphics example having the greatest similarity measurement to the user request;

determining a measure of similarity between the user request and each graphics example within the searched cluster; and

outputting at least one graphics example of the searched cluster having the greatest similarity measurement.

31. The apparatus of claim 29, further comprising the operations of:

determining whether the searched cluster has no clusters inside it; and

5 repeating the method of obtaining at least one stored graphics example with clusters at a highest hierarchical level inside the searched cluster, if there are clusters inside the searched cluster, until a cluster having no clusters inside it is found.

32. The apparatus of claim 29, wherein the operation of searching a cluster comprises the operations of:

10 selecting a representative graphics example from each cluster at the highest hierarchical level using an approximation; and

selecting the cluster having the representative graphics example with the greatest similarity measurement to the user request.

15 33. The apparatus of claim 32, wherein the approximation uses meta properties of the stored graphics examples.

34. The apparatus of claim 19, wherein the operation of creating graphics from at least one obtained graphics example comprises the operations of:

extracting at least one composition pattern from the database;

20 generalizing the at least one composition pattern;

determining whether at least one new composition is valid using at least one generalized composition pattern; and

selecting the most probable valid composition.

35. The apparatus of claim 34, further comprising the operations of:
generalizing at least one negative composition pattern; and
determining whether at least one new composition is invalid using at least one
generalized negative composition pattern.

5 36. The apparatus of claim 19, wherein the operation of creating a new sketch
comprises the operation of inferring visual decorations.

37. An article of manufacture for automatically generating graphics from a user
request, comprising a machine readable medium containing one or more programs which
when executed implements:

10 determining a measure of similarity between the user request and one or more
stored graphics examples;

 obtaining at least one stored graphics example based on the similarity measure;
and

 creating graphics from the at least one obtained graphics example and the user
15 request.